Preservo amplifiers for CD players
BA6376K

The BA6376K is a preservo amplifier that generates RF, focus error and tracking error signals from the signals output by voltage output optical pickups. Using this IC in combination with ROHM's DSP can significantly reduce the number of attached components for CD player servos and signal processing circuits.

●Applications
CD players

●Features
1) Internal focus search sequence, for better playability.
2) Internal disk defect detector.
3) Internal auto asymmetry circuit.
4) Internal APC circuit.
5) Internal focus protection against disk defects.

●Absolute maximum ratings (Ta = 25°C)

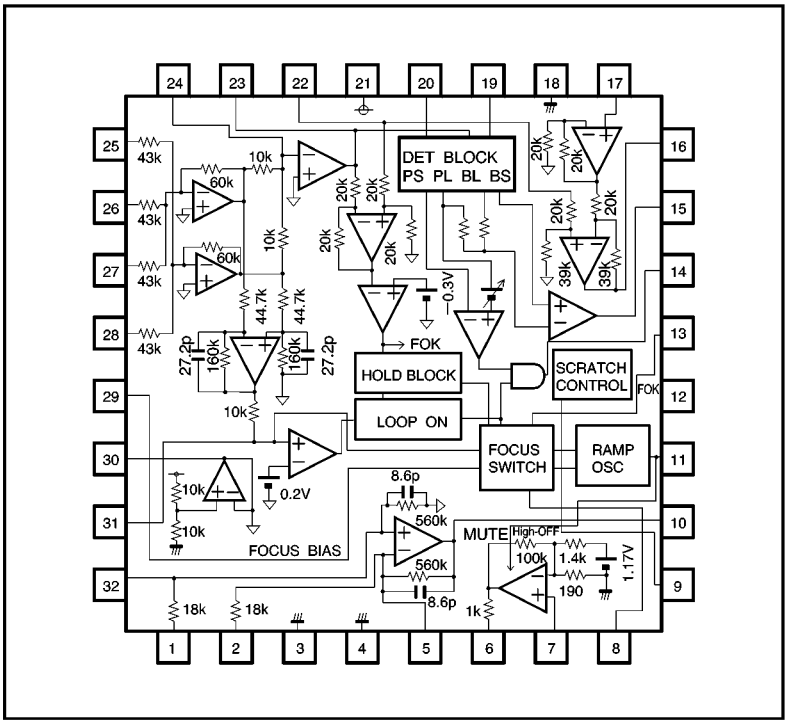
Parameter	Symbol	Limits	Unit
Power supply voltage	Vcc	9	V
Power dissipation	Pd	400*	mW
Operating temperature	Topr	−25~+75	℃
Storage temperature	Tstg	−55~+125	℃

* Reduced by 4.0 mW for each increase in Ta of 1℃ over 25℃.

●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	Vcc	3.1	3.4	3.8	V

●Block diagram



●Pin descriptions

Pin No.	Pin name	Function
1	E	E input
2	F	F input
3	AGND	Analog ground
4	DGND	Digital ground
5	FI	Feedback for adjusting F gain
6	LD	APC amplifier output
7	PD	APC amplifier input
8	R / H	Attach capacitor for ramp wave/loop-off
9	SC	Attach resistor for scratch depth adjustment
10	TE	Tracking error output
11	FON	Focus-on control
12	FOK	Focus-OK comparator output
13	FE	Focus error output 1
14	DEFECT	Defect signal output
15	MIRR	Mirror signal output
16	EFM	EFM signal output

Pin No.	Pin name	Function
17	ASY	Auto asymmetry control input
18	DETGND	Detector ground
19	BLH	Attach bottom-long capacitor
20	PLH	Attach peak-long capacitor
21	VCC	Power supply
22	RFI	Re-input of RF output capacitor coupling
23	RFO	RF summing amplifier output
24	RF−	Input of RF summing amplifier feedback
25	A	A input
26	B	B input
27	D	D input
28	C	C input
29	FEB	Input of focus error bias
30	VB	Bias amplifier output
31	FE'	Focus error output 2
32	EI	Feedback for E gain adjustment

●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{CC} = 3.4V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I_Q	5.0	9.0	13.0	mA	—
〈Bias amplifier〉						
Bias voltage	V_B	1.57	1.70	1.83	V	—
Maximum output (H)	I_{OH}	5.0	—	—	mA	Maximum bias differential = 200 mV
Maximum output (L)	I_{OL}	5.0	—	—	mA	Maximum bias differential = 200 mV
〈RF amplifier 〉						
Output voltage, offset	V_{OFRF}	−80	—	120	mV	—
Voltage gain	G_{RF}	20.5	23.5	26.5	dB	V7=1.5V,SG4=30mV_{P-P}, 1kHz
Maximum output amplitude (H)	V_{OHRF}	1.35	1.50	—	V	Simultaneous input of AC and BD V8=V_B±3V
Maximum output amplitude (L)	V_{OLRF}	—	−0.6	−0.3	V	
〈FE amplifier〉						
Output voltage, offset	V_{OFFE}	−100	—	100	mV	—
Voltage gain (AC)	G_{FEAC}	23	26	29	dB	SG4=30mV_{P-P}, 1kHz
Voltage gain (BD)	G_{FEBD}	23	26	29	dB	SG4=30mV_{P-P}, 1kHz
Voltage gain differential	ΔG_{FE}	−3	0	3	dB	—
Maximum output amplitude (H)	V_{OHTE}	1.35	1.50	—	V	Separate measurement of inputs AC and BD V8=V_B±0.2V
Maximum output amplitude (L)	V_{OLTE}	—	−1.50	−1.35	V	
〈TE amplifier〉						
Output voltage, offset	V_{OFTE}	−80	—	80	mV	—
Voltage gain (E)	G_{TEE}	27	30	33	dB	SG1=30mV_{P-P}, 1kHz
Voltage gain (F)	G_{TEF}	27	30	33	dB	SG1=30mV_{P-P}, 1kHz
Voltage gain differential	ΔG_{TE}	−3	0	3	dB	—
Maximum output amplitude (H)	V_{OHTE}	1.35	1.50	—	V	Separate measurement of inputs E and F V1=V_B±0.3V
Maximum output amplitude (L)	V_{OLTE}	—	−1.50	−1.35	V	
〈FOK comparator〉						
Threshold voltage	V_{THFK}	0.2	0.3	0.4	V	Pin 22 input
Output high level voltage	V_{OHFK}	2.8	—	—	V	V6=V_B−0.4V
Output low level voltage	V_{OLFK}	—	—	0.6	V	V6=V_B−0.2V
Maximum operating frequency	F_{MXFK}	45	—	—	kHz	—
〈Asymmetrical amplifier〉						
Output voltage, offset	V_{OFAS}	−60	—	60	mV	—
Voltage gain (1)	G_{1AS}	3	6	9	dB	Pin 22 input, 80mV_{P-P}, 1kHz
Voltage gain (2)	G_{2AS}	8.5	11.5	14.5	dB	Pin 17 input, 80mV_{P-P}, 1kHz
Maximum output amplitude (H)	V_{OHAS}	0.70	0.90	—	V	Pin 22 or 17 input V6=V_B±1.0
Maximum output amplitude (L)	V_{OLAS}	—	−1.4	−1.0	V	
〈APC amplifier〉						
Output voltage (1)	V_{O1AP}	2.5	3.0	—	V	Pin 7 input 180 mV
Output voltage (2)	V_{O2AP}	—	0.9	1.5	V	Pin 7 input 120 mV
Maximum output amplitude (H)	V_{OHAP}	2.7	3.0	—	V	Pin 7 input 220 mV
Maximum output amplitude (L)	V_{OLAP}	—	1.9	2.2	V	Pin 7 input 0V with 0.8mA flowing through Pin 6

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
〈Mirror detector〉						
Output high level voltage	V_{OHMR}	3.0	—	—	V	—
Output low level voltage	V_{OLMR}	—	—	0.5	V	—
Minimum operating frequency	F_{MNMR}	—	—	600	Hz	—
Maximum operating frequency	F_{MXMR}	30	—	—	kHz	—
Minimum input voltage	V_{MNMR}	—	—	0.2	V_{P-P}	—
Maximum input voltage	V_{MXMR}	1.2	—	—	V_{P-P}	—
〈Defect detector〉						
Output high level voltage	V_{OHDF}	3.0	—	—	V	—
Output low level voltage	V_{OLDF}	—	—	0.5	V	—
Minimum operating frequency	F_{MNDF}	—	—	1	kHz	—
Maximum operating frequency	F_{MXDF}	2	—	—	kHz	—
Minimum input voltage	V_{MNDF}	—	—	0.5	V_{P-P}	—
Maximum input voltage	V_{MXDF}	1.2	—	—	V_{P-P}	—
Pin 9 voltage	V9	0.95	1.20	1.45	V	—
〈Ramp generator circuit〉						
Capacitance charging current	I_{SIRA}	−2.10	−1.60	−1.10	μA	—
Capacitance discharging current	I_{SORA}	10.0	15.0	20.0	μA	—
High level limit voltage	V_{LHRA}	0.10	0.24	0.38	V	—
Low level limit voltage	V_{LLRA}	−0.38	−0.24	−0.10	V	—
〈FON pin〉						
Inrush current	I_{IFON}	10.0	15.0	20.0	μA	—
Input threshold voltage	V_{THFO}	1.30	1.65	2.00	V	—
〈Loop on〉						
Loop off delay time	t_{OFLO}	4.0	6.5	9.0	msec	—

* When FON is LOW, pin 8 voltage is V_B.
* The ramp wave begins at the bottom.
* The loop will not turn ON when the ramp wave is at the bottom.
* Pin 8 is charged rapidly when the loop turns ON.

●Measurement circuit

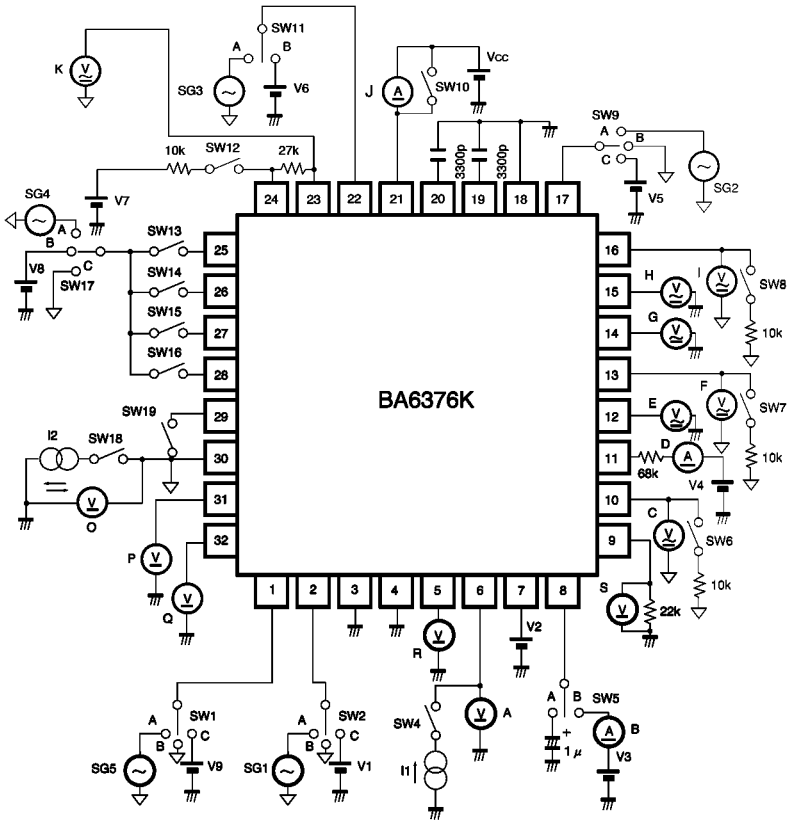


Fig. 1

●Circuit operation

Focus search sequence operations

When the loop turns on

The focus loop turns on when the fall of FEC is detected while FOK is at the HIGH level.

When the loop turns off

The focus loop turns off after the elapse of a delay (T[S], see below) after FOK changes to the LOW state.

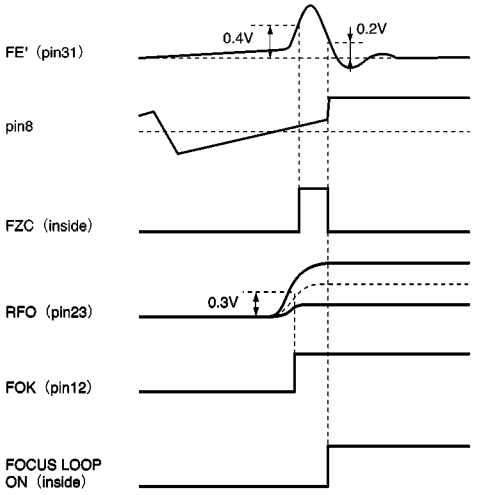


Fig. 2

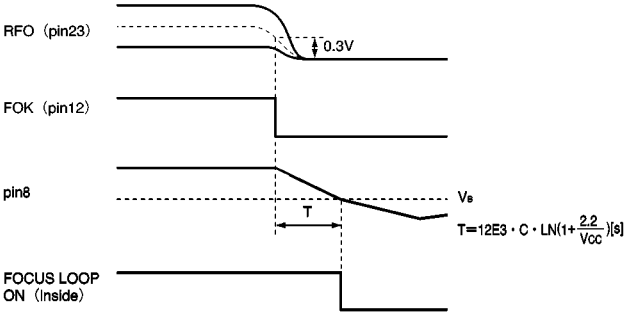
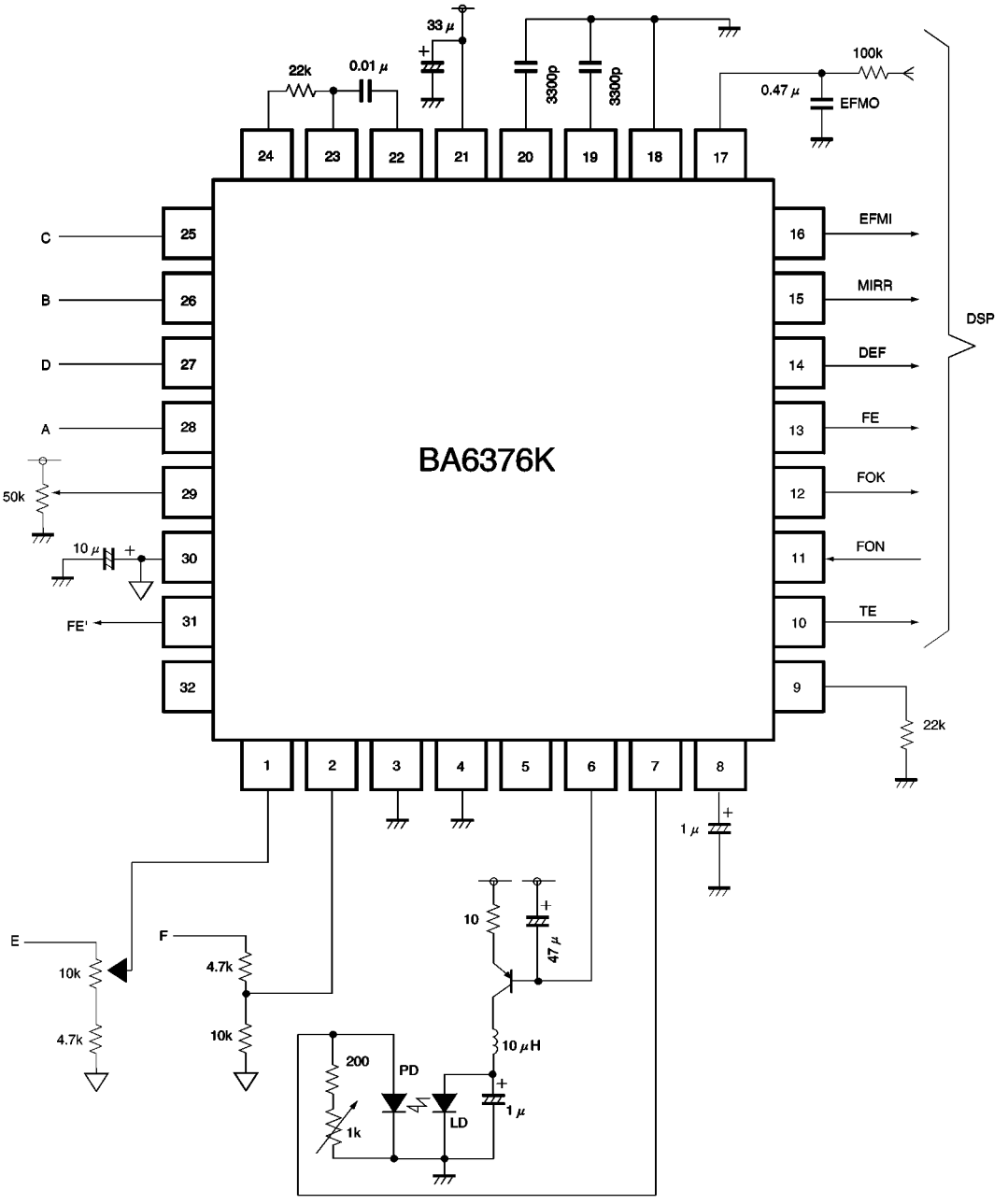


Fig. 3

●Application example



Note : Attach a resistor (at least 10 kΩ) between pins 23 and 24.

Fig. 4

●Electrical characteristic curves

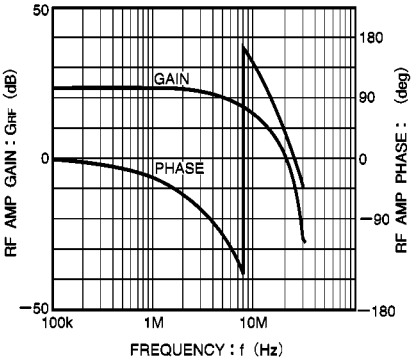


Fig. 5 Radio frequency amplifier frequency characteristics

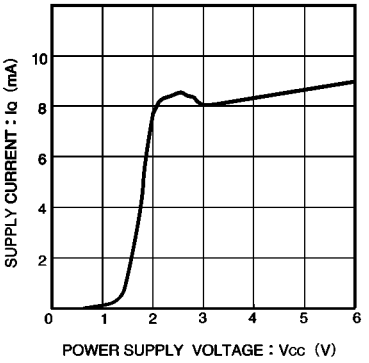


Fig. 6 Power suppy voltage vs. suppy current

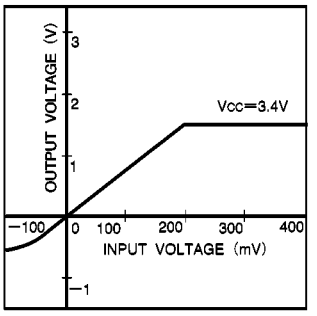


Fig. 7 Radio frequency amplifier I/O characteristics (AC or BD input)

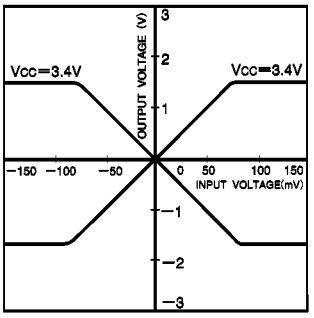


Fig. 8 FE amplifier I/O characteristics

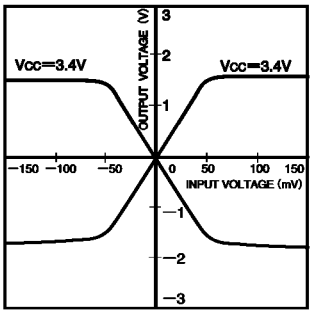


Fig. 9 TE amplifier I/O characteristics

●External dimensions (Units: mm)